

Combo Express Modio™

AC-5618

User's Manual

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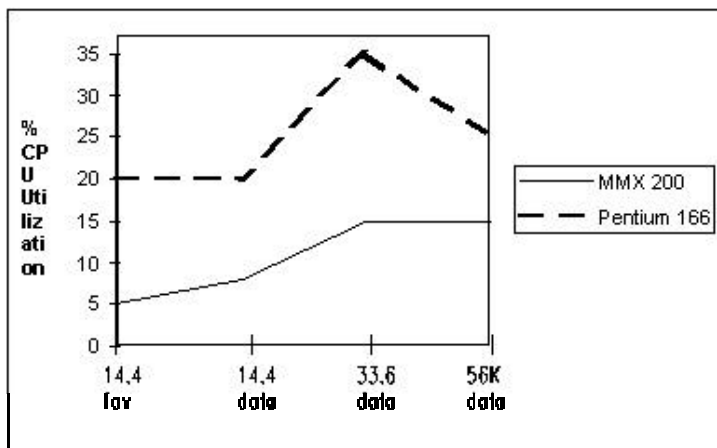
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INTRODUCTION

Thank you for purchasing the Combo Express Modio™. This manual provides the operating instructions and technical specifications for your new modem.

With the Analog Devices AD1821 SoundComm™ single chip technology, the Combo Express Modio™ supports both 3D sound for PC gaming and 56Kbps modem for Internet access, fax and telephone answering applications. The Combo Express Modio™ includes signal processing software running on the host CPU and the AD1821 controller IC. The software drivers included in the solution utilize the Pentium® or Pentium® MMX™ CPU to process modem, fax and telephony digital signals. The controller IC provides all analog-to-digital and digital-to-analog conversion for the telephone line interface. In addition, the Combo Express Modio™ is fully compliant with the Microsoft® PC97 audio specification. It emulates all Sound Blaster® Pro version 2.01 functions through a combination of the 20-voice, OPL3-compatible music synthesizer and dedicated hardware.

Host-based signal processing (HSP) modem software developed by SmartLink, Ltd., which allows the Combo Express Modio™ to be easily configured in a variety of ways. End-users can request modem only, modem plus telephony, or integrated modem, telephony and audio. To assure the user experiences robust, full-function application performance, the HSP software dynamically balances the communications services with the user's overall operating demands, keeping CPU utilization to a minimum (see diagram).



The Combo Express Modio™ includes Analog Devices's 3D stereo enhancement technology, Phat™ Stereo. Three dimensional stereo enhancement is a popular feature for consumer PCs where computer games are favorite applications. An enhancement to the two-speaker environment, Phat™ Stereo extends the apparent sound stage beyond the physical position of the left and right speakers. This is particularly important in a desktop PC configuration where speakers are rarely more than a few feet apart.

FEATURES & SPECIFICATIONS

Modem specification

Virtual UART interface with speed up to 460,800 bps throughput

Supports Unimodem V and TAPI

Hayes AT and AT#V command sets

V.90 & K56Flex (56,000 bps)

V.34bis (33,600 bps), V.34(28,800 bps)

V.32bis (14,400 bps), V.32(9600 bps)

V.22bis (2400 bps)

Bell 103 / Bell 212

V.8 and Automode

V.42 MNP 2-4 error correction

V.42bis/MNP 5 data compression

V.80 for H.324 video conferencing

DTMF detection and generation

Caller ID (if available)

ADPCM voice compression

Call forwarding and conferencing

Voice / Fax / modem distinction

Full-duplex speakerphone

14,400 bps V.17 Group 3 fax plus optional voice and telephony features

Sound Features

- 16 bit ISA plug and play compatible
- Full-duplex sound codec for simultaneous record and playback
- Phat™ Stereo 3D phase expander
- OPL3-compatible music synthesizer
- Enhanced digital game port
- MPC Level 3 analog mixer
- Six channel digital mixer
- MPU-401 compatible MIDI port and joystick interface
- Power management modes
- Fully compliant with Microsoft® PC 97 audio requirements
- 100% compatible Sound Blaster® Pro, AdLib®/OPL3, including Windows DOS box

SYSTEM REQUIREMENTS

Pentium® based PC 166MHz or above

32MB System Memory

Windows 95/98

Available ISA bus slot

WARNING! DO NOT use this model if your system does not meet the above requirements. Try the other models of ActionMedia modem series.

+ NOTE: Our general recommendation is that a system should have a 200MHz processor minimum for best performance.

The following CPUs have been tested to run properly with the current drivers.

Intel Pentium®-166 and higher (with or without MMX™)

AMD-200 and higher

Cyrix M2-166 and higher

Cyrix MediaGX M-233 and higher

UNPACKING YOUR MODEM

Your modem package contains the following items:

- ✓ Modem
- ✓ Telephone cable
- ✓ User's Manual
- ✓ Driver Diskettes
- ✓ Software

Combo Express Modio is an ActionMedia product

Modio is modem-over-audio technology patented by Smartlink

SoundComm and Phat are trademarks of Analog Devices, Inc.

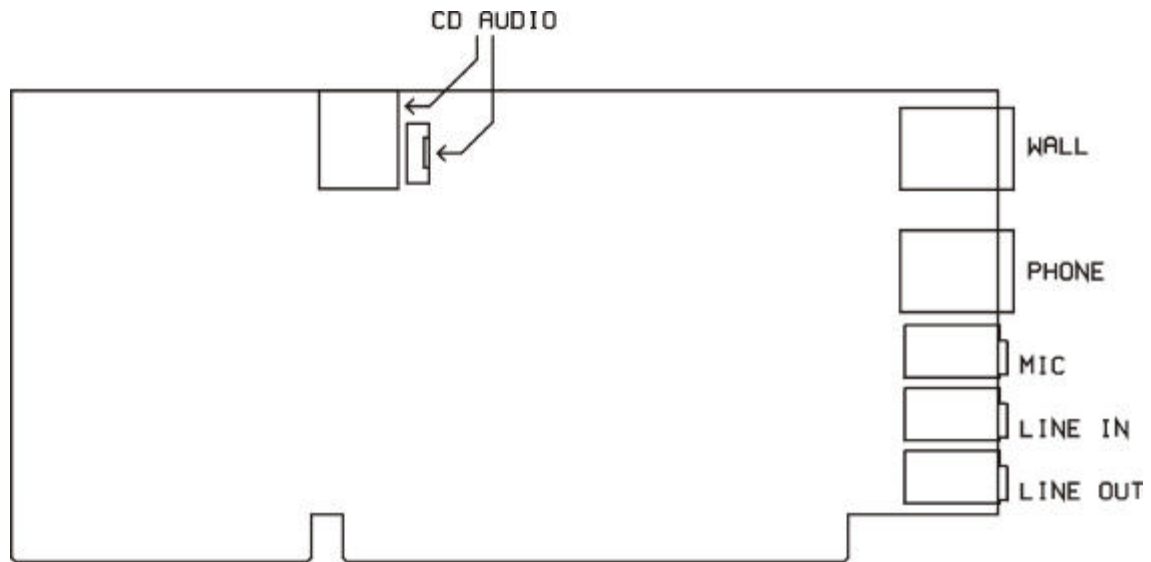
K56flex is a trademark of Rockwell International and Lucent Technologies

MNP is a trademark of Compaq Computer Corporation.

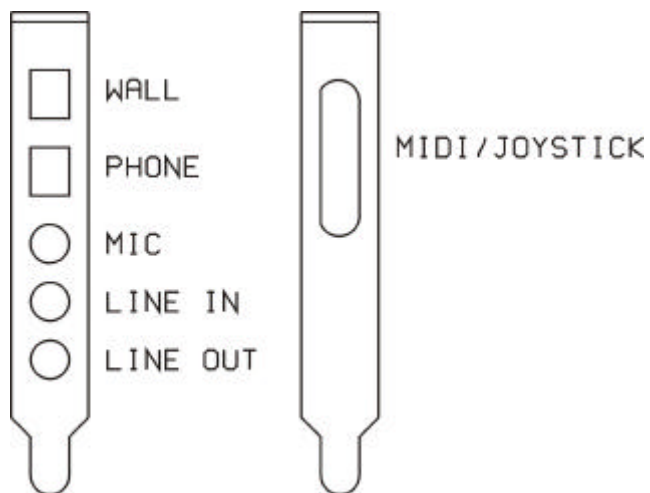
VoiceView is a registered trademark of Radish Communications, Inc.

All brand names and trademarks are the property of their respective owners.

COMPREHENSIVE BOARD VIEW



Board Size: 159 mm x 76 mm



HARDWARE INSTALLATION

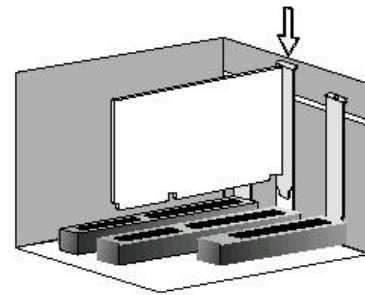
CAUTION!

Before removing the cover from your computer, please ensure it is turned off.

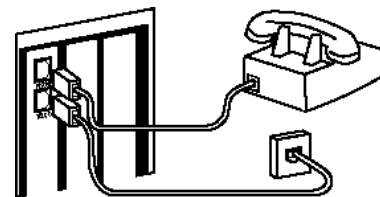
Discharge any static electricity from your body by touching any bare metal surface on the computer chassis before removing the card from its anti-static bag.

Installation Procedures

1. Ensure the computer is off by removing all power cables.
2. Remove the computer's cover, taking care to follow the manufacturer's instructions.
3. Locate an unused 16-bit ISA expansion slot; unscrew and remove the metal bracket the covers the card-slot opening. (Save the screw to use when securing the multifunction adapter in your computer.)
4. Carefully insert the card into the selected slot. Apply even pressure until the card is firmly seated.
5. Secure the bracket with a screw.
6. Replace the computer's cover and reconnect all power cables.
7. Connect the telephone cable into the modem's 'LINE' socket (if it is not already connected). Attach the other end to the telephone wall jack.



8. If you have an addition telephone set, you may connect it to the 'PHONE' socket found on this modem.



Connecting the Microphone and Speaker

There are two RCA type plugs labeled "MIC" and "LINE OUT". Connect the microphone to the "MIC" plug and an external speaker to "LINE OUT" plug. Your bundled software will utilize these features for speakerphone or voice mail applications. Refer to your software manual for details.

Sharing Your Sound Device's Speakers

If you have your speakers connected to a sound device already, you can share the speakers with this speakerphone modem. You will hear your voice conversation on the speakers. You need to buy a short audio cable with “RCA jacks” at both ends. Connect one end to the “LINE OUT” plug of this modem and the other end to the “LINE IN” plug of the sound device. Then enable the “LINE IN” function of your sound device in Windows 95/98.

GETTING ONLINE

+ **NOTE:** There are 2 selections available

1. Modem + Sound (*Default Setting*)
2. Modem Only

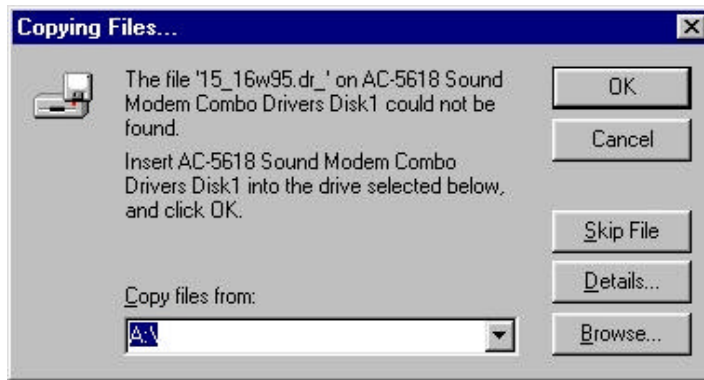
Using Combo Express Modio with full features of Modem and Sound

Install Driver in Windows 95/98

1. Power on the computer after plugging in the Combo Express Modio.
2. When Windows detects the new hardware, the wizard will complete the installation. “AC-5618 Sound Modem Combo” is displayed.

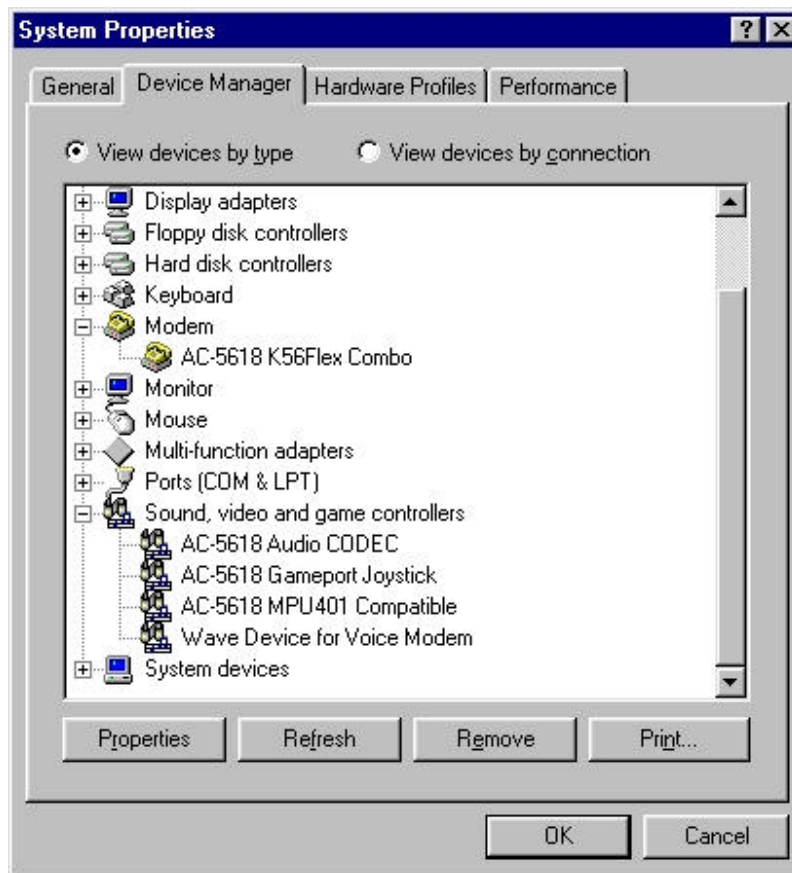


3. Insert the disk labeled “ COMBO EXPRESS DRIVERS - Disk 1”, then click “**Next**”.
4. Click “**Next**” when Windows detects “AC-5618 Audio CODEC”, click “**Finish**”.



5. Ensure the correct driver disk is properly inserted, click “**OK**”, and located the Driver Disk 1 in A:\ then click “**OK**” for copying the files.
6. Click “**Finish**” and Windows will prompt you again to change the Driver Disk 2. Remove the Driver Disk 1 and insert the Driver Disk 2.
7. Remove the Driver Disk from floppy disk drive. Windows may prompt you click “**Yes**” to restart your computer for setting up the new hardware.
8. Hardware setup wizard will continue the installation automatically. Windows will prompt you again to insert the required Driver Disk. Click “**OK**” and enter the path again if it is necessary.
9. When you hear the “Windows start-up” sound when the Windows is started. After you have chosen the country where you are located from the from the Soft Modem Configuration box, congratulation! The installation is completed.

+ **NOTE:** Verify all the drivers are properly installed, from “**Start**”- “**Settings**” - “**Control Panel**”, double click on “**System**” icon and the “**Device Manager**” tab for details.



For Windows 98 User

Installing procedures of the Combo Express Modio for the Windows 98 are basically the same as the Windows 95.

1. Start booting Windows.
2. Windows 98 will display Add New Hardware Wizard. This wizard will search for the new drivers for the Combo Express Modio. Click **“Next”**.
3. Check the box for “Search for the best driver for your device (Recommended)”, and click **“Next”**.
4. Check the box to specify a location, for example if your floppy disk drive is A:\ , insert supplied Driver Disk, check the box of the floppy disk drive and click **“Next”**.
5. Windows will search for the driver device for “AC-5618 Audio CODEC”. Click **“Next”**.
6. Windows has finished the software for “AC-5618 Audio CODEC”. Click **“Finish”**. Windows will install “AC5618 MPU-401”, “AC-5618 K56Flex /V.90 Combo”, “AC5618 Gameport Joystick”, “Wave device for Voice Modem”, “AC-5618 Voice Modem wave device”.
7. When you have selected the country where you are located from the Soft Modem Configuration box, you hear the “Windows start-up” sound, then the Windows is started. Congratulations! You have completed the installation of your Combo Express Modio.

Using Combo Express Modio as Modem Only

+ IMPORTANT! The Combo Express Modio has been configured by the factory as full feature Modem and Sound. Apparently, you must re-configure the Combo Express Modio with the provided “**Programming Tools Disk**” before processing the following procedures, if you wish to use the Combo Express Modio as Modem only. (Refer to the section of “**The Programming Tools**” for details).

Install Driver in Windows 95/98

1. Power on the computer after plugging in the Combo Express Modio.
2. When Windows detects the new hardware, the wizard will complete the installation. “AC-5618 56Kbps Modem” is displayed.



3. Insert the disk labeled “MODEM ONLY DRIVERS”, then click “**Next**”.
4. Windows has finished the software for “AC-5618 K56Flex /V.90 Modem”. Click “**Finish**”. Windows will install “Wave device for Voice Modem”, “AC-5618 Voice Modem wave device”.
5. After you have selected the country where you are located from the Soft Modem Configuration box, congratulation! The installation is completed.

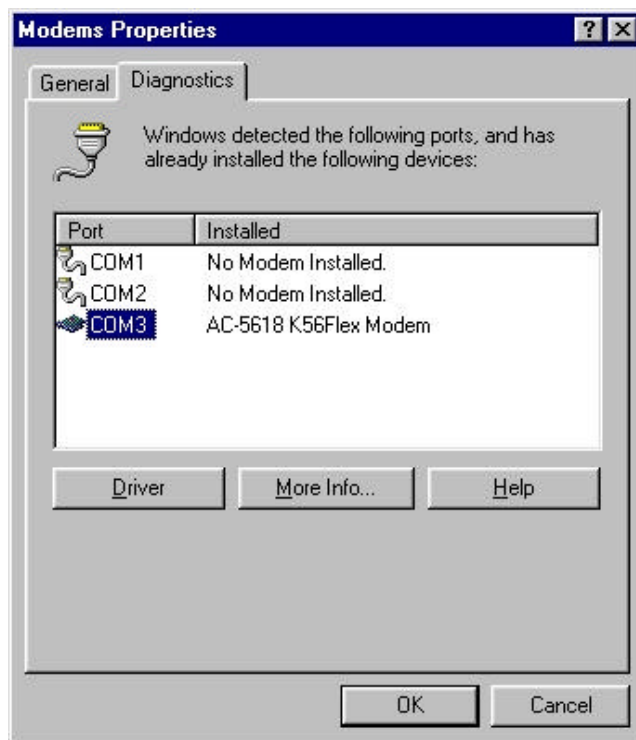
For Windows 98 User

1. Start booting Windows.
2. Windows 98 will display Add New Hardware Wizard. This wizard will search for the new drivers for the Combo Express Modio. Click **“Next”**.
3. Check the box for “Search for the best driver for your device (Recommended)”, and click **“Next”**.
4. Check the box to specify a location, for example if your floppy disk drive is A:\ , insert “Modem Only Drivers”, check the box of the floppy disk drive and click **“Next”**.
5. Windows will search for the driver device for “AC-5618 56Kbps Modem”. Click **“Next”**.
6. Windows has finished the software for “AC-5618 K56Flex /V.90 Modem”. Click **“Finish”**. Windows will install “Wave device for Voice Modem”, “AC-5618 Voice Modem wave device”.
7. After you have selected the country where you are located from the Soft Modem Configuration box, congratulations! The installation is completed.

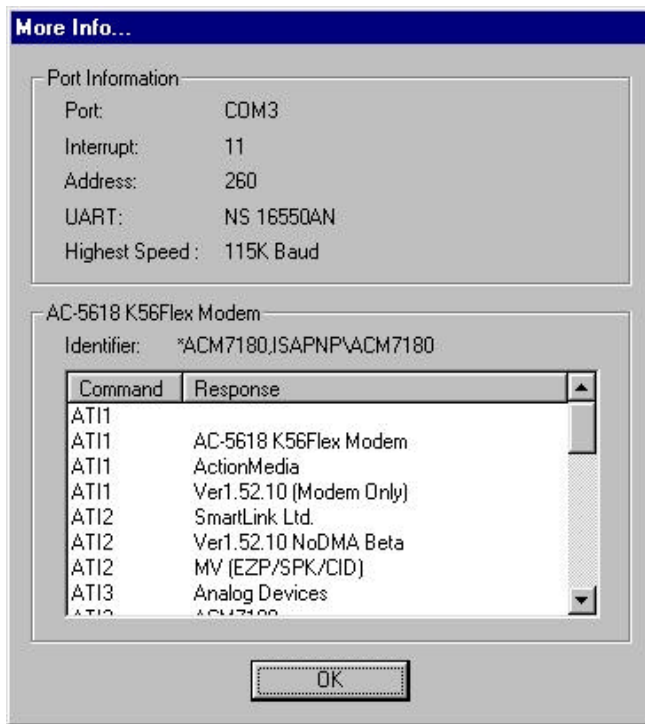
TESTING YOUR MODEM

After you have completed the hardware and software installation. Verify your modem is working properly with the following procedures.

1. Click “**Start**”, select “**Settings**” and “**Control Panel**”.
2. Double click on “**Modems**”.
3. Click on the tab “**Diagnostics**”. Highlight the COM port icon that is assigned to your modem.



4. Select the “**More Info...**” button. Windows will start communicating with your modem, and report on its status.



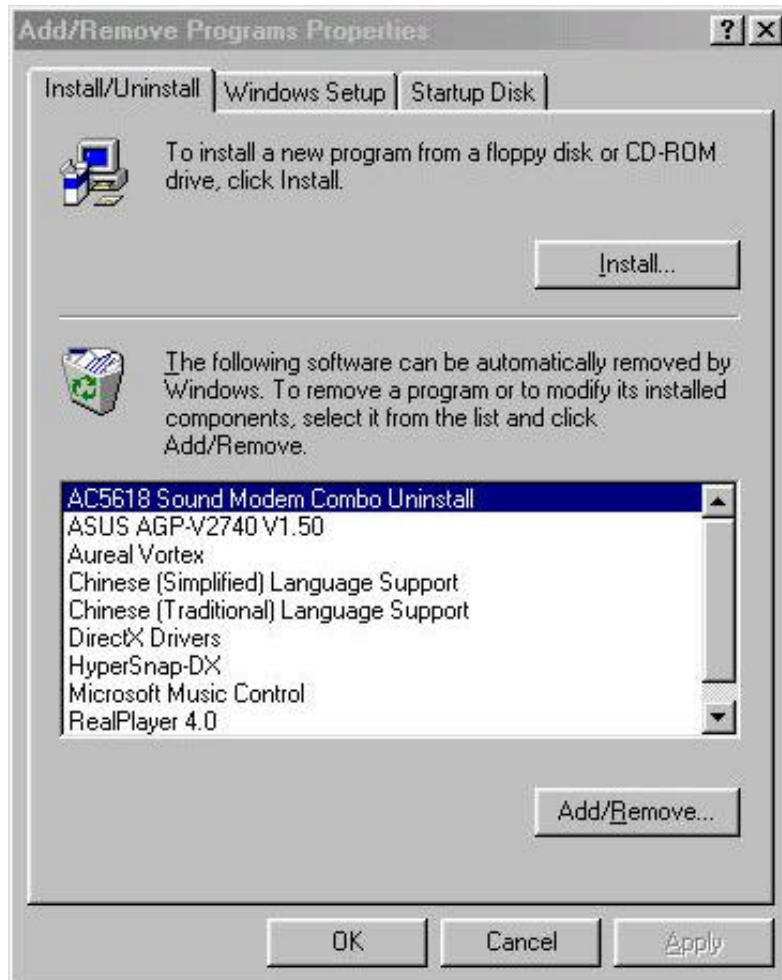
+ **NOTE:** Windows informs you that this takes a moment as it communicates with the modem. You'll see the More info dialog box showing your port information and the AT+ commands, which verify modem installation. Remember, only one communications software package can be running at a time. After a few seconds, Windows will display the information replied from the modem. Your modem is working.

SETTING UP YOUR COMMUNICATIONS SOFTWARE

To install your communications software, refer to the communications software manual.

UNINSTALL DRIVER IN WINDOWS 95/98

To uninstall the drivers of the Combo Express Modio: Double Click on **My Computer**, then **Control Panel**, then “Add/Remove Programs”. Select “AC-5618 Uninstall” or “AC-5618 Sound Modem Combo Uninstall” to uninstall. Click on “Remove”.



THE PROGRAMMING TOOLS

The **PROGRAMMING TOOLS** disk is provided for configure your Combo Express Modio to be a full features 56Kbps Modem and 3D Sound device or just a 56Kbps Modem only. Carefully follow the steps as below, you can easily switch these two different modes back and forward as you wish.

Configure the Combo Express Modio as Modem Only

Step 1: Press “**F8**” when you start booting from Windows, choose option 6 to jump to **Command prompt only**. Or, start your Windows and Restart the computer in **MS-DOS mode**.

Step 2: Insert the **PROGRAMMING TOOLS** disk in A:, then change the directory to **A:\>**

Step 3: Type “**MODEM**”, press “**Enter**”. The following screen will be displayed.

```
512 bytes read from “clear.bin”
P&P Serial ID: FFFFFFFFFFFFFFFF
Serial ID checksum added 35
P&P read port at 36B
AD1821A is using external ROM
End of write!!!
313 bytes read from “modem.bin”
P&P Serial ID: 046D7180FFFFFFFFF00
Serial ID checksum added 2F
P&P read port at 36B
AD1821A is using internal ROM
End of write!!!
EEPROM write successfully
```

!!! Please, don’t forget to reset your PC !!!

Press any key to continue.....

Step 4: Please note that “**EEPROM write successfully**” should be displayed as above. Remove the “**PROGRAMMING TOOLS**” disk from A:, then reset your system, the programming procedure is completed. If the above does not show or the programming fails to write on the EEPROM, reset the system and repeat from the Step 1.

Configure the Combo Express Modio as full features Modem & Sound

The original Combo Express Modio has been configured as full features 56Kbps Modem and 3D Sound by the factory. It is not necessary to re-configure if you wish to use this device with full features. Apparently, you could configure your Combo Express Modio from the Modem mode only back to the original configuration with full features by the steps as follows.

Step 1: Press “**F8**” when you start booting from Windows, choose option 6 to jump to **Command prompt only**. Or, start your Windows and Restart the computer in **MS-DOS mode**.

Step 2: Insert the **PROGRAMMING TOOLS** disk in A:, then change the directory to **A:\>**

Step 3: Type “**COMBO**”, press “**Enter**”. The following screen will be displayed.

```
512 bytes read from "clear.bin"
P&P Serial ID: FFFFFFFFFFFFFFFFFF
Serial ID checksum added 35
P&P read port at 36B
AD1821A is using external ROM
End of write!!!
282 bytes read from "combo.bin"
P&P Serial ID: 04937180FFFFFFFF00
Serial ID checksum added B6
P&P read port at 36B
AD1821A is using internal ROM
End of write!!!
EEPROM write successfully
```

!!! Please, don't forget to reset your PC !!!

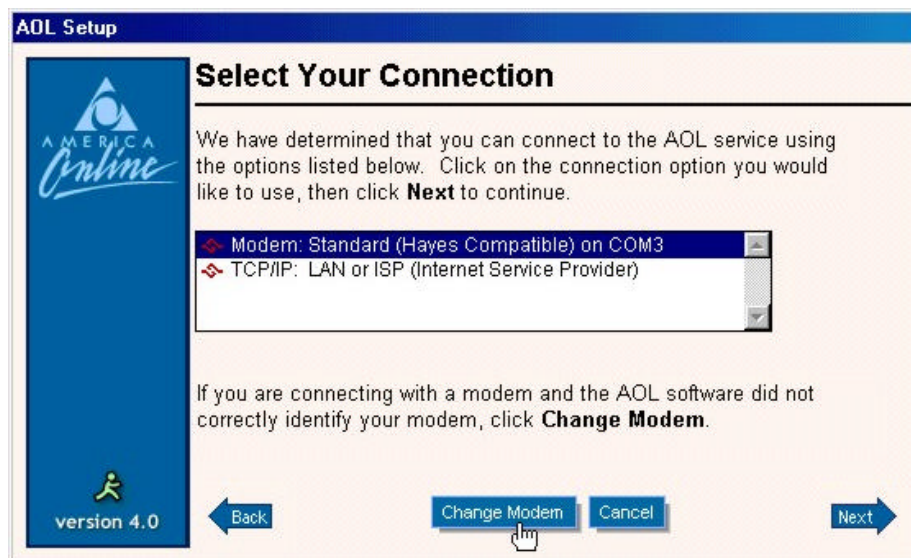
Press any key to continue.....

Step 4: Please note that “**EEPROM write successfully**” should be displayed as above. Remove the “**PROGRAMMING TOOLS**” disk from A:, then reset your system, the programming procedure is completed. If the above does not show or the programming fails to write on the EEPROM, reset the system and repeat from the Step 1.

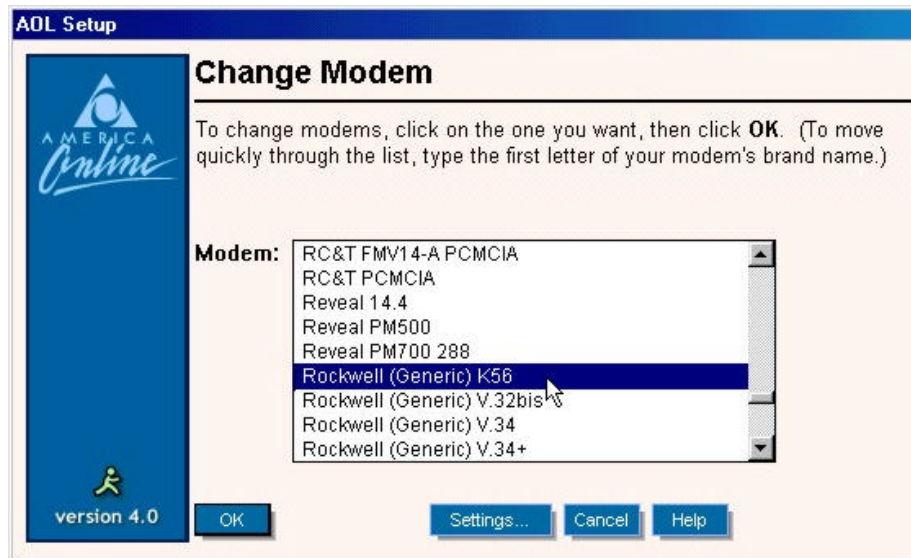
ACCESS INTERNET WITH AMERICA ONLINE (AOL.COM)

If you have chosen to use America Online to access Internet, ensure that you have got the latest version 4.0 or above to achieve a high speed close to 56Kbps with Combo Express Modio. However, AOL Setup version 4.0 has been bundled with the latest Microsoft Windows 98 package. Since an earlier than 4.0 version of AOL Setup may not support the 56Kbps modems.

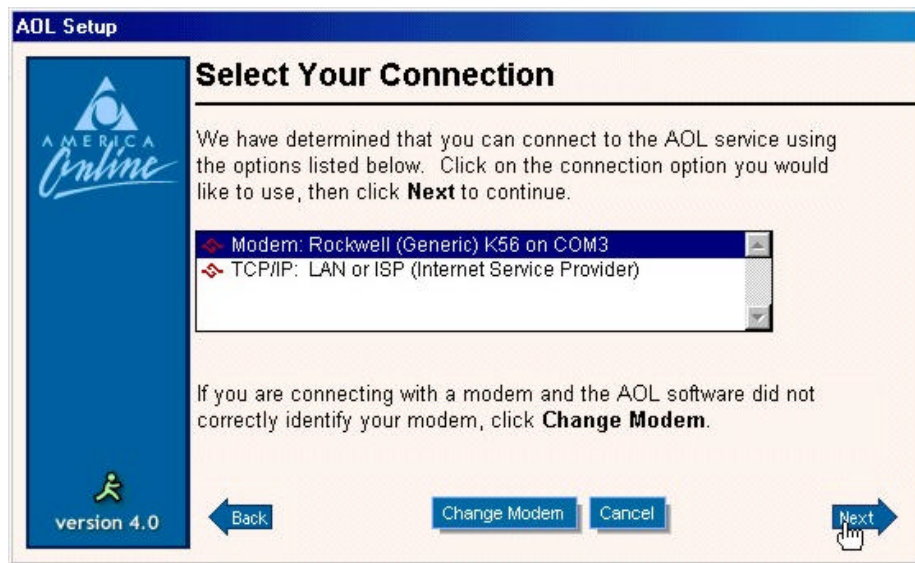
The AOL Setup will list the connections that you may have connected to the AOL, it will display as follows:



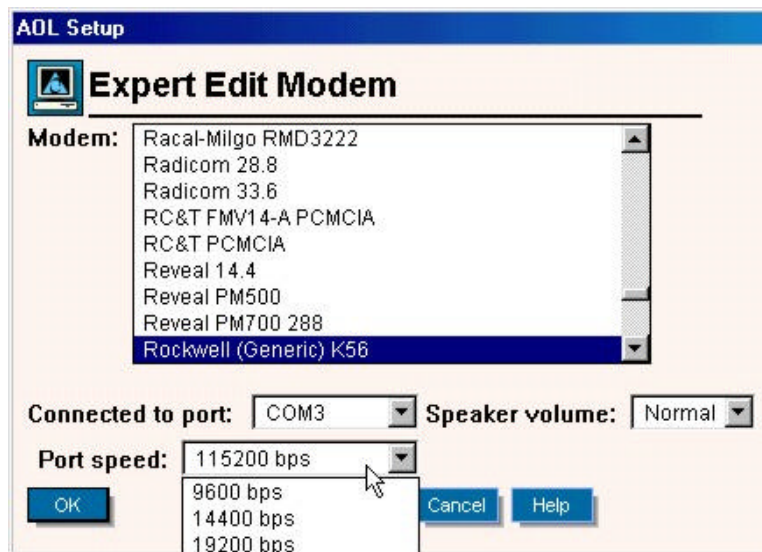
Click “Change Modem” to select an appropriate Modem on the next screen.



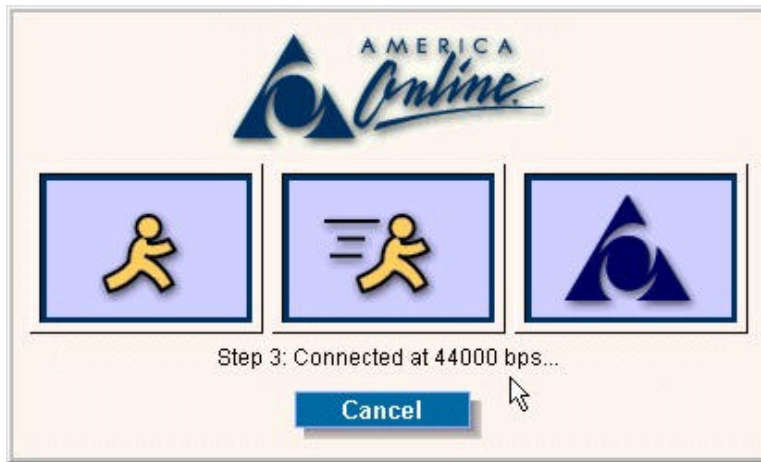
Choose “**Rockwell (Generic) K56**” and then click “**OK**”. It will go back to the previous selection screen with the chosen modem displayed.



Click “**Next**” to continue the setup. Configure your modem if it is required.



After you have completed the AOL Setup, the correct DCE connection speed could be established.



+ **NOTE:** Due to FCC regulations which restrict power output of service providers' modems, receiving speeds are limited to 53 Kbps. Actual speeds may vary depending on line conditions and other factors. Requires analog phone line and server equipment compatible with 56K technology.

Troubleshooting

If the modem will not connect over the line to another modem...

Check your modem and your telephone connections.

Try a lower speed. Change this in the communications software.

Modem does not seem to perform at rated speed

The service or modem you normally communicate with can only operate at a slower speed.

Cannot contact Internet provider with recommended AT command string

Check with your Internet Service Provider for requirements.

If the modem will not answer an incoming call...

Auto-answer may not be enabled. Refer to your software instructions to enable auto-answer.

Modem hangs up when incoming call is received

Disable call-waiting function for the on-line service, Internet connection, and/or communications software you are using.

No dial tone or a similar message is received

Check phone line connection.

If modem is plugged into a phone line splitter, remove it and try connecting the line directly to a telephone wall jack.

If the modem disconnects unexpectedly...

Try dialing the number again. Also, check for loose connections between the modem and computer or between the modem and telephone. If the connections seem secure, you may have had a bad connection. Try again.

Modem does not function and no sound is heard

Double-click on the Volume Control icon in the task bar. The Volume Control dialog box opens. Uncheck the Mute box in the Combo Express Modio Wave Output.

No sound heard when Windows is launched

Verify that the speaker is properly connected to the LINE OUT connector. If an active speaker system is used, make sure the power is turned on, and the volume is turned up.

Verify that the Master Volume control slider in the Windows Volume Control applet is in its highest position, and that the Mute all check box for this control is unchecked.

Frequently Asked Questions

Basic Modem Questions

1. How does 56K work? What is V.90?

56Kbps speed can be achieved only when downloading or receiving data from an ISP (Internet Service Provider). Sending or uploading to ISP is still at 33.6Kbps.

The revolutionary breakthrough of 56Kbps is made possible by utilizing the digital telephone network in the ISP location or corporate central sites. These speeds cannot be achieved with modem-to-modem connections. Because this technology bypasses the analog-to-digital conversion in the ISP site, in the downstream path, 56K protocol can use a larger portion of the network bandwidth. Thus making the downloading faster.

Before February 1998, there were two incompatible 56K standards, namely, X2 and K56Flex. If an ISP implements the X2, you cannot connect to 56K with K56flex (however, you can still connect to 33.6Kbps).

In February 1998, the ITU-T committee endorsed a preliminary standard, which will make X2 and K56Flex compatible. The new standard is called ITU V.90 standard.

This modem has both the V.90 and K56flex protocol in the driver. The modem will detect the answering ISP modem to see if it is V.90 or K56flex.

2. How do I use the voice features?

The voice feature is actually a digital voice messaging system. Like your old tape answering machine, your voice modem answers a phone call, plays greeting, and recording caller's voice mail just like an answering machine. However, your voice modem can do more. All voice messages, greetings and playbacks are converted into digital files. These files can be played using your sound card. You can also take your sound card WAV files and play them to the modem or use it as a message.

Power features include caller ID, pager notification, fax on demand are available in software such as *Bitware*, *QuickLink*, *Supervoice* and *Winfax*. The Combo Express Modio is compatible with all the popular voice fax software.

3. How do I use the speakerphone feature?

The Combo Express Modio speakerphone feature works like your regular speakerphone of your telephone. You use the bundle software to switch to the speakerphone modem. When you use the software, your conversation will be heard on the speaker connected to your modem. If you plug a microphone to the MIC jack of the modem, you can talk through the microphone.

4. I connected to my ISP at 57,600 bps, but it is very slow when downloading files or getting my e-mail, why?

Your modem can only go as fast as the other side can send data. If there are many users connected to your ISP, you may be encountering an electronic traffic jam. Try a different ISP or dial-up during off peak hours and see the difference.

Installation and Setup Questions

1. I use Win 3.1 or DOS, what should I do?

This modem is designed for Pentium PC with Windows 95/98 only. If you use Win3.1 or DOS, you need the **ActionMedia** hardware controller modem, such as AC-5601, AC-5602, or AC-5603).

2. After I install everything and try to dial, my software says “No Dial Tone”, why?

Check the following things:

- (a) The phone cord from the wall jack (Telephone Company) is plugged into the jack label “WALL” or “LINE” in the modem.
- (b) Plug a regular phone into the “Phone” jack and lift it up to hear a dial tone.
- (c) If you have a voice mail feature from your phone company (answering machine service), make sure the “message waiting” tone is clear. In other word, you should not hear the fast tone. Clear your message waiting.

3. After I got connected, different software will report different connection speeds. Or why do different modem report different speeds?

There are two speeds reported by the modem and your software. The DTE speed is the transmission speed from your modem to your PC. The “Line Speed” or the “Connected at xxxxxx” speed reported by the modem is the carrier speed or the actual speed the modem will transmit data through the phone line to the other end. Because your modem has data compression feature, it is actually sending more data to your PC after it decompresses the data from the other end.

Your software and modem should report the “Line Speed” rather than the DTE speed. Because of line noise conditions, your modem may connect at slower speed for each call. The speed will also drop if the phone line gets noisy after you are connected.

By the way, it takes 10 bits (1 start, 1 stop and 8 data bits) to send one byte or character with your ordinary modem. So 56Kbps (56,000 bps) is actually 5,600 byte per character.

4. I only connect at 33.6kbps, not 56kbps.

Combo Express Modio is a 56K-Ready modem. The 56K software driver is now available at our web site. Please always verify and download the latest driver from the Download page at <http://www.actionwell.com>

Customer Support

Technical information, including product literature, answers to commonly asked questions, information on software upgrades and other topics is available electronically through the following:

World Wide Web (WWW) site at:

<http://www.actionwell.com>

FCC Compliance

FCC PART 15 DECLARATION OF CONFORMITY FOR HOME OR OFFICE USE

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by using the following measures:

- Reorient the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC REQUIREMENTS

This equipment complies with FCC rules Part 68. Located on the equipment is the FCC Registration Number and Ringer Equivalence Number (REN). You must provide this information to the telephone company if requested.

The REN is used to determine the number of devices you may legally connect to your telephone line. In most areas, the sum of the REN of all devices connected to one line must not exceed five (5.0). You should contact your telephone company to determine the maximum REN for your calling area.

This equipment uses the following USOC jacks: RJ-11C.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

An FCC compliant telephone cord and modular plug are provided with this equipment, which is designed to connect to the telephone network or premises wiring using a Part 68 compliant compatible jack. See installation instructions for details.

Caution to the User

The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Glossary of Terms

analog loopback

A modem self-test in which data from the keyboard or an internal test pattern is sent to the modem's transmitter, turned into analog form, looped back to the receiver, and converted back into digital form.

analog signals

A variety of signals and wavelengths that can be transmitted over communications lines such as the sound of a voice over the phone line.

answer mode

The mode used by your modem when answering an incoming call from an originating modem. The transmit/receive frequencies are the reverse of the originating modem, which is in **originate mode**.

application

A computer program designed to perform a specific task or set of tasks. Examples include word processing and spreadsheet applications.

ARQ

Automatic Repeat reQuest. A function that allows your modem to detect flawed data and request that it be retransmitted. See **MNP** and **V.42**.

ASCII

American Standard Code for Information Interchange. A code used to represent letters, numbers, and special **characters** such as \$, !, and /.

asynchronous transmission

Data transmission in which the length of time between transmitted **characters** may vary. Because characters may not be transmitted at set intervals, **start/stop** bits are used to mark the beginning and end of each character.

auto answer

Sets the modem to pick up the phone line when it detects a certain number of rings. See S-register S0 in the "Technical Quick Reference."

auto dial

A process where your modem dials a call for you. The dialing process is initiated by sending an ATDT (dial tone) or ATDP (dial pulse) command followed by the telephone number. Auto dial is used to dial voice numbers. See command Dn.

baud rate

A term used to measure the speed of an analog transmission from one point to another. Although not technically accurate, baud rate is commonly used to mean **bit rate**.

binary digit

A 0 or 1, reflecting the use of the binary numbering system. Used because the computer recognizes either of two states, OFF or ON. Shortened form of binary digit is bit.

bit rate

Also referred to as transmission rate. The number of **binary digits**, or bits, transmitted per second (**bps**). Communications channels using analog modems are established at set bit rates, commonly 2400, 4800, 9600, 14,400, 28,800 and higher.

bits per second (bps)

The bits (**binary digits**) per second rate. Thousands of bits per second are expressed as kilobits per second (kbps).

buffer

A temporary memory area used as storage during input and output operations. An example is the modem's command buffer.

byte

A group of **binary digits** stored and operated upon as a unit. Most often the term refers to 8-bit units or **characters**. One kilobyte (KB) is equal to 1,024 bytes or characters; 640 KB is equal to 655,360 bytes or characters.

carrier

The basic signal altered or modulated by the modem in order to carry information.

character

A representation, coded in **binary digits**, of a letter, number, or other symbol.

characters per second (CPS)

A data transfer rate generally estimated from the **bit rate** and the **character** length. For example, at 2400 bps, 8-bit characters with **start/stop bits** (for a total of ten bits per character) will be transmitted at a rate of approximately 240 characters per second (cps). Some **protocols**, such as error-control protocols, employ advanced techniques such as longer transmission **frames** and **data compression** to increase cps.

class 1 and 2.0

International standards used by fax **application** programs and faxmodems for sending and receiving faxes.

cyclic redundancy checking (CRC)

An error-detection technique consisting of a test performed on each block or **frame** of data by both sending and receiving modems. The sending modem inserts the results of its tests in each data block in the form of a CRC code. The receiving modem compares its results with the received CRC code and responds with either a positive or negative acknowledgment.

data communications

The transmission or sharing of data between computers via an electronic medium.

data compression table

A table containing values assigned for each **character** during a call under **MNP5** data compression. **Default** values in the table are continually altered and built during each call: The longer the table, the more efficient **throughput** gained.

data mode

Mode used by a modem when sending and receiving data files.

DCE

Data Communications (or Circuit-Terminating) Equipment, such as dial-up modems that establish and control the data link via the telephone network.

default

Any setting assumed, at startup or reset, by the computer's software and attached devices. The computer or software will use these settings until changed by the user or other software.

detect phase

In the **ITU-T V.42** error-control **protocol**, the first stage in establishing if both modems attempting to connect have **V.42** capability.

dictionary

The term used for compression codes built by the **V.42** bis data compression algorithm.

digital loopback

A test that checks the modem's RS-232 interface and the cable that connects the **terminal** or computer and the modem. The modem receives data (in the form of **digital signals**) from the computer or terminal, and immediately returns the data to the screen for verification.

digital signals

Discrete, uniform signals. In this manual, the term refers to the **binary digits** 0 and 1.

DTE

Data **Terminal** (or Terminating) Equipment. A computer that generates or is the final destination of data.

duplex

Indicates a communications channel capable of carrying signals in both directions. See **half duplex**, **full duplex**.

Electronic Industries Association (EIA)

Group which defines electronic standards in the U.S.

error control

Various techniques that check the reliability of **characters (parity)** or blocks of data. **V.42** and **MNP** error-control **protocols** use error detection (**CRC**) and retransmission of flawed **frames (ARQ)**.

facsimile

A method for transmitting the image on a page from one point to another. Commonly referred to as fax.

fax mode

The mode used by a modem to send and receive data in **facsimile** format. See definitions for **V.17**, **V.27ter**, **V.29**.

flow control

A mechanism that compensates for differences in the flow of data into and out of a modem or other device. See commands **&Hn**, **&In**, **&Rn**.

frame

A **data communications** term for a block of data with header and trailer information attached. The added information usually includes a frame number, block size data, error-check codes, and Start/End indicators.

full duplex

Signals can flow in both directions at the same time over one line. In microcomputer communications, may refer to the suppression of the online **local echo**.

half duplex

Signals can flow in both directions, but only one way at a time. In microcomputer communications, may refer to activation of the online **local echo**, which causes the modem to send a copy of the transmitted data to the screen of the sending computer.

Hz

Hertz, a frequency measurement unit used internationally to indicate cycles per second.

ITU-T

An international organization that defines standards for telegraphic and telephone equipment. For example, the Bell 212A standard for 1200-bps communication in North America is observed internationally as ITU-T **V.22**. For 2400-bps communication, most U.S. manufacturers observe **V.22 bis**.

LAPM

Link Access Procedure for Modems. An error-control **protocol** defined in **ITU-T** Recommendation **V.42**. Like the **MNP** protocols, LAPM uses **cyclic redundancy checking (CRC)** and retransmission of corrupted data (**ARQ**) to ensure data reliability.

local echo

A modem feature that enables the modem to display keyboard commands and transmitted data on the screen. See command **En**.

MNP

Microcom Networking Protocol, an error-control **protocol** developed by Microcom, Inc., and now in the public domain. There are several different MNP protocols, but the most commonly used one ensures error-free transmission through error detection (**CRC**) and retransmission of flawed **frames**.

modem

A device that transmits/receives computer data through a communications channel such as radio or telephone lines. It also changes signals received from the phone line back to **digital signals** before passing them to the receiving computer.

nonvolatile memory (NVRAM)

User-programmable random access memory whose data is retained when power is turned off. On the Sportster modem, it includes four stored phone numbers and the modem settings.

off/on hook

Modem operations that are the equivalent of manually lifting a phone receiver (taking it off-hook) and replacing it (going on-hook).

online fall back/fall forward

A feature that allows high-speed, error-control modems to monitor line quality and fall back to the next lower speed in a defined range if line quality diminishes. As line conditions improve, the modems switch up to the next higher speed.

originate mode

The mode used by your modem when initiating an outgoing call to a destination modem. The transmit/receive frequencies are the reverse of the called modem, which is in **answer mode**.

parity

A simple error-detection method that checks the validity of a transmitted **character**. Character checking has been surpassed by more reliable and efficient forms of error checking, including **V.42** and **MNP 2-4 protocols**. Either the same type of **parity** must be used by two communicating computers, or both may omit parity.

protocol

A system of rules and procedures governing communications between two or more devices. Protocols vary, but communicating devices must follow the same protocol in order to exchange data. The format of the data, readiness to receive or send, error detection and error correction are some of the operations that may be defined in protocols.

RAM

Random Access Memory. Memory that is available for use when the modem is turned on, but that clears of all information when the power is turned off. The modem's RAM holds the current operational settings, a **flow control buffer**, and a command **buffer**.

remote digital loopback

A test that checks the phone link and a remote modem's transmitter and receiver.

remote echo

A copy of the data received by the remote system, returned to the sending system, and displayed on the screen. Remote echoing is a function of the remote system.

ROM

Read Only Memory. Permanent memory, not user-programmable.

serial transmission

The consecutive flow of data in a single channel. Compare to parallel transmissions where data flows simultaneously in multiple channels.

start/stop bits

The signaling bits attached to a **character** before and after the character is transmitted during **asynchronous transmission**.

terminal

A device whose keyboard and display are used for sending and receiving data over a communications link. Differs from a microcomputer or a mainframe in that it has little or no internal processing capabilities.

terminal mode

Software mode that allows direct communication with the modem. Also known as command mode.

throughput

The amount of actual user data transmitted per second without the overhead of **protocol** information such as **start/stop bits** or **frame** headers and trailers. Compare with **characters per second**.

V.8

The **ITU-T** standard specification that covers the initial handshaking process.

V.17 fax

An **ITU-T** standard for making **facsimile** connections at 14,400 bps, 12,000 bps, 9,600 bps, and 7,200 bps.

V.21

An **ITU-T** standard for modems operating in asynchronous mode at speeds up to 300 bps, **full-duplex**, on public switched telephone networks.

V.22

An **ITU-T** standard for modem communications at 1200 bps, compatible with the Bell 212A standard observed in the U.S. and Canada.

V.22 bis

An **ITU-T** standard for modem communications at 2400 bps. The standard includes an automatic link negotiation fallback to 1200 bps and compatibility with Bell 212A/V.22 modems.

V.27 ter

An **ITU-T** standard for **facsimile** operations that specifies modulation at 4800 bps, with fallback to 2400 bps.

V.29

An **ITU-T** standard for **facsimile** operations that specifies modulation at 9600 bps, with fallback to 7200 bps.

V.32

An **ITU-T** standard for modem communications at 9600 bps and 4800 bps. V.32 modems fall back to 4800 bps when line quality is impaired.

V.32 bis

An **ITU-T** standard that extends the V.32 connection range: 4800, 7200, 9600, 12,000, and 14,400 bps. V.32 bis modems fall back to the next lower speed when line quality is impaired, fall back further as necessary, and also fall forward (switch back up) when line conditions improve (see **online fall back/fall forward**).

V.34

An **ITU-T** standard that currently allows data rates as high as 28,800 bps.

V.34+

An enhancement to **V.34** that enables data transfer rates as high as 33,600 bps.

V.42

An **ITU-T** standard for modem communications that defines a two-stage process of detection and negotiation for **LAPM error control**.

V.42 bis

An extension of **ITU-T V.42** that defines a specific data compression scheme for use during V.42 connections.

Xmodem

The first of a family of **error control** software **protocols** used to transfer files between modems. These protocols are in the public domain and are available from many bulletin board services.

XON/XOFF

Standard **ASCII** control **characters** used to tell an intelligent device to stop/resume transmitting data.

Ymodem

An error-checking **protocol** that can send several files of data at a time in 1024-**byte** (1K) blocks. This protocol can use either checksums or CRC for error checking.

Ymodem G

Similar to **Ymodem**, except it includes no error checking, which makes it faster.

Zmodem

Similar to **Xmodem** and **Ymodem**, except it includes batch transfer, the ability to recover from a partially complete transfer, an autostart feature, and improved efficiency.